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Lighter aircraft come from new approach

by Carol Young, Air Vehicles Directorate

WRIGHT-PATTERSON AFB, OHIO — The Air Vehicles Directorate's Design and Analysis Branch is studying Active Aeroelastic Wing technology (AAW) through a full-scale flight research program. This technology is a new wing structural design approach that uses static aeroelastic deformation in the wing to net advantage during maneuvering.

"[AAW] is a novel approach for controlling wing aeroelastic twist. It will eventually change the way wings are designed," said Ed Pendleton, AAW program manager. "It is also a small step towards the future, a future where aircraft wing design will be more efficient and used in a way similar to the way birds use their wings."

The branch, Georgia Tech and Lockheed Martin recently completed a design study showing the benefits of the AAW design approach versus the conventional design for a lightweight fighter aircraft. The process used in this study determined parameters of preliminary structural design and aerodynamic analysis models, response surface methodology to map the design for the AAW approach, the conventional design approach, trim optimization and structural design optimization.

The fighter vehicle designed with the AAW philosophy is significantly lighter than a conventionally designed vehicle. The Design and Analysis Branch is continuing this investigation with alternative aeroelastic design methods and an expanded scope of design parameters and requirements.

The directorate hopes to transition AAW technology to other business sectors, which will require educating designers about the new philosophy.

"The use of an AAW design approach is enabling for many new high performance concepts and could translate into large takeoff gross weight savings for future air vehicles, given a set of fixed perfomance requirements," Pendleton said. "The larger and faster an air vehicle needs to be, the more dramatic the weight and cost savings can be." **@**